



**Generation Interconnection
Feasibility Study Report
for
Queue Project AE2-173
MCLEAN 345 KV
50 MW Capacity / 50 MW Energy**

July, 2019

Table of Contents

1	Preface.....	4
2	General.....	6
2.1	Primary Point of Interconnection	7
2.2	Cost Summary.....	7
3	Transmission Owner Scope of Work.....	8
4	Attachment Facilities	8
5	Direct Connection Cost Estimate.....	8
6	Non-Direct Connection Cost Estimate.....	8
7	Schedule.....	9
8	Transmission Owner Analysis.....	10
9	Interconnection Customer Requirements.....	12
10	Revenue Metering and SCADA Requirements	13
11	Network Impacts for Primary Point of Interconnection	14
12	Generation Deliverability	16
13	Multiple Facility Contingency	16
14	Contribution to Previously Identified Overloads	16
15	Potential Congestion due to Local Energy Deliverability.....	17
16	System Reinforcements.....	19
17	Flow Gate Details	20
17.1	Index 1	21
17.2	Index 2	23
17.3	Index 3.....	25
17.4	Index 4.....	27
17.5	Index 5.....	29
17.6	Index 6.....	31
17.7	Index 7.....	33
17.8	Index 8.....	35
18	Affected Systems	38
18.1	LG&E.....	38
18.2	MISO	38
18.3	TVA.....	38

18.4	Duke Energy Progress.....	38
18.5	NYISO	38
19	Short Circuit.....	41
20	Secondary Point of Interconnection General	42
20.1	Secondary Point of Interconnection.....	42
20.2	Cost Summary.....	42
21	Network Impacts for Secondary Point of Interconnection.....	43
22	Generation Deliverability	45
23	Multiple Facility Contingency	45
24	Contribution to Previously Identified Overloads	45
25	Potential Congestion due to Local Energy Deliverability.....	46
26	Flow Gate Details	48
26.1	Index 1	49
26.2	Index 2	51
26.3	Index 3	53
26.4	Index 4	55
26.5	Index 5	57
27	Short Circuit.....	61

1 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

An Interconnection Customer with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

PJM utilizes manufacturer models to ensure the performance of turbines and inverters is properly captured during the simulations performed for stability verification and, where applicable, for compliance with low voltage ride through requirements. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B of Manual 14G. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines or inverters and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a \$10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of

way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

2 General

The Interconnection Customer (IC), has proposed an energy storage generating facility located in McLean County, Illinois. The installed facilities will have a total capability of 50 MW with 50 MW of this output being recognized by PJM as Capacity (500 MWhr of storage). The proposed in-service date for this project is December 31, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AE2-173
Project Name	MCLEAN 345 KV
State	Illinois
County	McLean
Transmission Owner	ComEd
MFO	50
MWE	50
MWC	50
Fuel	Battery
Basecase Study Year	2022

2.1 Primary Point of Interconnection

Queue Position AE2-173, a 50 MW storage facility, proposes to interconnect with the ComEd transmission system by tying into the 345kV bus at the Interconnection Substation proposed in the AB2-047 project.

2.2 Cost Summary

The AE2-173 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$ 1,000,000
Direct Connection Network Upgrade	none
Non Direct Connection Network Upgrades	\$ 3,000,000
Total Costs	\$4,000,000

In addition, the AE2-173 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades Loadflow	none

Cost allocations for these upgrades will be provided in the System Impact Study Report.

3 Transmission Owner Scope of Work

4 Attachment Facilities

The AE2-173 generator lead would interconnect to the 345kV bus at the Interconnection Substation proposed in the AB2-047 project. The required Attachment Facilities are one 345kV line MOD, a dead-end structure and revenue metering as shown in the one-line diagram.

Scope of Work	Cost Estimate
Installation of one 345kV line MOD, one dead-end structure and one set of revenue metering (see notes below on cost estimate)	\$1,000,000

5 Direct Connection Cost Estimate

None.

6 Non-Direct Connection Cost Estimate

Prior to the AE2-173 queue project, AB2-047 would build an Interconnection Substation in a breaker-and-a-half configuration. The generator lead for AE2-173 would be interconnected to this substation by expanding it.

The scope of work includes the installation of one 345 kV circuit breaker at this Interconnection Substation to create a line position for the IC's generator lead, as shown in the one-line diagram below. Please note that if the AB2-047 project withdraws from the New Services queue, the interconnection scope for AE2-173 would change.

The Interconnection Customer ("IC") is responsible for constructing all of the facilities on the IC side of the Point of Interconnection ("POI") outside of the substation.

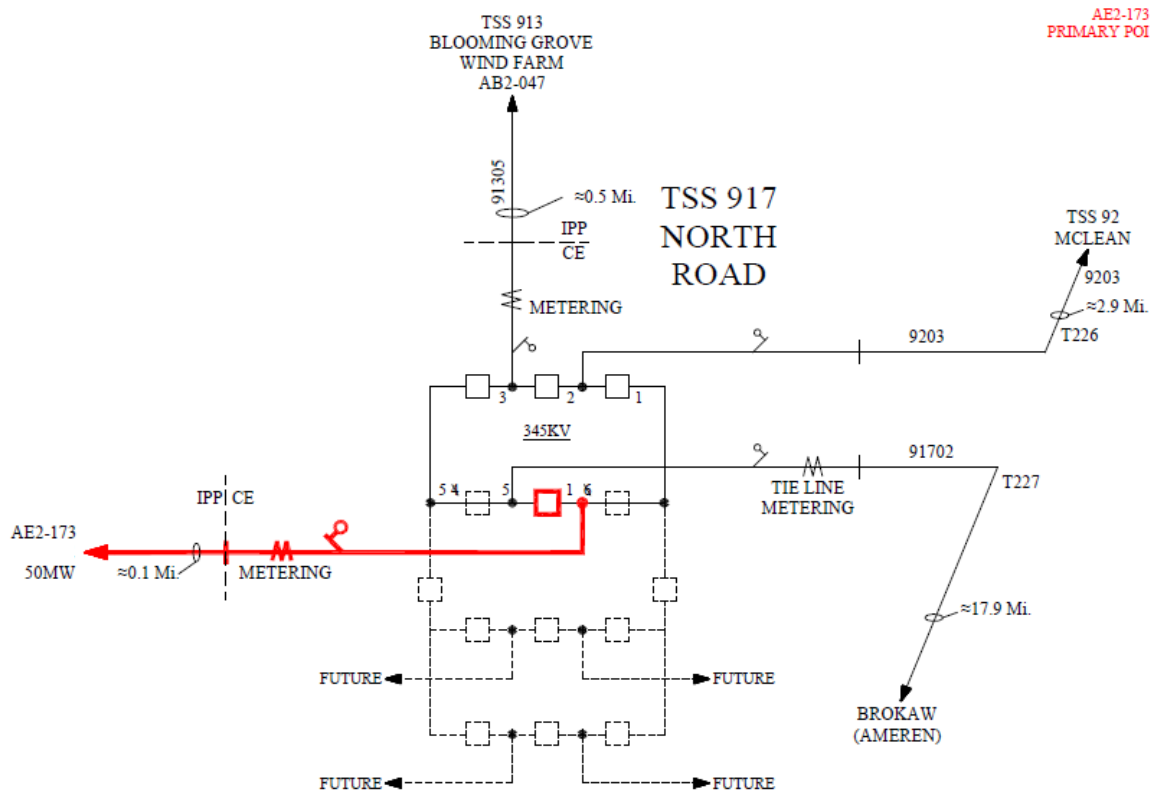
The estimated cost for the non-Direct Connection Network upgrade is given below.

Scope of Work	Cost Estimate
Installation of one 345kV circuit breaker at the AB2-047 Interconnection TSS and relay/protection work	\$3,000,000
Total Cost Estimate (see notes below on cost estimate)	\$3,000,000

7 Schedule

ComEd would take approximately 24-months to construct the substation work after the ISA / ICSA are signed.

8 Transmission Owner Analysis



Notes on Cost Estimate:

- 1) These estimates are Order-of-Magnitude estimates of the costs that ComEd would bill to the customer for this interconnection. These estimates are based on a one-line electrical diagram of the project and the information provided by the IC.
- 2) There were no site visits performed for these estimates. There may be costs related to specific site related issues that are not identified in these estimates. The site reviews will be performed during the Facilities Study or during detailed engineering.
- 3) These estimates are not a guarantee of the maximum amount payable by the IC and the actual costs of ComEd's work may differ significantly from these estimates. The IC will be responsible for paying actual costs of ComEd's work in accordance with Sections 212.1 and 217 of the PJM Open Access Transmission Tariff.
- 4) The IC is responsible for all engineering, procurement, testing and construction of all equipment on the IC's side of the POI.
- 5) These cost estimates do not include cost of acquiring right-of-way for the transmission line and purchasing any additional land, if needed, for the line terminations. The need and cost of acquiring property and associated legal costs will be investigated during Facilities Study for this project.

9 Interconnection Customer Requirements

ComEd interconnection requirements can be found at <https://www.pjm.com/planning/design-engineering/to-tech-standards/private-comed.aspx>

To the extent that these Applicable Technical Requirements and Standards may conflict with the terms and conditions of the Tariff, the Tariff shall control.

ComEd distribution line drops to move customer cranes and heavy equipment is not part of PJM process. The customer should directly contact ComEd New Business Group to arrange for line drops, if needed.

10 Revenue Metering and SCADA Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O.

11 Network Impacts for Primary Point of Interconnection

The Queue Project AE2-173 was evaluated as a 50.0 MW (Capacity 50.0 MW) injection tapping the Pontiac to Brokaw 345kV line in the ComEd area. Project AE2-173 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-173 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

Summer Peak Load Flow

12 Generation Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247258	270853	PONTIAC ; R	CE	935000	AD1-133 TAP	CE	1	COMED_P1-2_345-L11212_B-S-C-B	single	1528.0	97.45	98.95	DC	22.87

13 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

14 Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247225	270704	LORETTO ; B	CE	939400	AE1-172 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	109.28	110.91	DC	24.76
2247226	270704	LORETTO ; B	CE	939400	AE1-172 TAP	CE	1	COMED_P1-2_345-L8014__-S-A	single	1528.0	104.29	105.91	DC	24.76
2246982	270796	KINCAID ; B	CE	347955	7AUSTIN	AMIL	1	COMED_P4_080-45-BT7-8_FSA	breaker	956.0	125.89	126.89	DC	9.59
2247247	270852	PONTIAC ; B	CE	270704	LORETTO ; B	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	106.62	108.24	DC	24.78
2247248	270852	PONTIAC ; B	CE	270704	LORETTO ; B	CE	1	COMED_P1-2_345-L8014__-S-A	single	1528.0	100.74	102.36	DC	24.78
2247257	270853	PONTIAC ; R	CE	935000	AD1-133 TAP	CE	1	COMED_P1-2_345-L11212_B-S-C-A	single	1528.0	100.38	101.87	DC	22.87
2247292	917500	Z2-087 TAP	CE	270853	PONTIAC ; R	CE	1	COMED_P1-2_345-L8002__-S	single	1528.0	104.78	106.98	DC	33.72
2247293	917500	Z2-087 TAP	CE	270853	PONTIAC ; R	CE	1	COMED_P1-2_345-L17802__-S	single	1528.0	102.09	104.3	DC	33.73
2247307	924040	AB2-047 TAP	CE	917500	Z2-087 TAP	CE	1	COMED_P1-2_345-L8002__-S	single	1528.0	105.29	107.5	DC	33.73
2247308	924040	AB2-047 TAP	CE	917500	Z2-087 TAP	CE	1	COMED_P1-2_345-L17802__-S	single	1528.0	102.85	105.06	DC	33.74
2247239	935000	AD1-133 TAP	CE	270717	DRESDEN ; R	CE	1	COMED_P1-2_345-L11212_B-S-C-A	single	1528.0	108.14	109.64	DC	22.87
2247240	935000	AD1-133 TAP	CE	270717	DRESDEN ; R	CE	1	COMED_P1-2_345-L11212_B-S-C-B	single	1528.0	103.82	105.31	DC	22.87

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247216	939400	AE1-172 TAP	CE	934720	AD1-100 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	114.98	116.6	DC	24.76
2247217	939400	AE1-172 TAP	CE	934720	AD1-100 TAP	CE	1	COMED_P1-2_345-L8014__-S-A	single	1528.0	109.1	110.72	DC	24.76

15 Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247220	270704	LORETTO ; B	CE	939400	AE1-172 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	operation	1528.0	199.99	201.61	DC	24.76
2247222	270704	LORETTO ; B	CE	939400	AE1-172 TAP	CE	1	Base Case	operation	1364.0	150.59	151.82	DC	16.84
2247242	270852	PONTIAC ; B	CE	270704	LORETTO ; B	CE	1	COMED_P1-2_345-L8014__-S-B	operation	1528.0	188.13	189.75	DC	24.78
2247244	270852	PONTIAC ; B	CE	270704	LORETTO ; B	CE	1	Base Case	operation	1364.0	137.92	139.15	DC	16.86
2247251	270853	PONTIAC ; R	CE	935000	AD1-133 TAP	CE	1	COMED_P1-2_345-L11212_B-S-C-A	operation	1528.0	185.71	187.21	DC	22.87
2247256	270853	PONTIAC ; R	CE	935000	AD1-133 TAP	CE	1	Base Case	operation	1334.0	123.85	124.89	DC	13.84
2247329	348847	7BROKAW	AMIL	937160	AD2-153 TAP	CE	1	COMED_P1-2_345-L8002__-S	operation	1528.0	133.7	134.76	DC	16.34
2247287	917500	Z2-087 TAP	CE	270853	PONTIAC ; R	CE	1	COMED_P1-2_345-L8002__-S	operation	1528.0	162.11	164.32	DC	33.72
2247291	917500	Z2-087 TAP	CE	270853	PONTIAC ; R	CE	1	Base Case	operation	1334.0	133.89	136.68	DC	37.19
2247302	924040	AB2-047 TAP	CE	917500	Z2-087 TAP	CE	1	COMED_P1-2_345-L8002__-S	operation	1528.0	154.79	156.99	DC	33.73
2247306	924040	AB2-047 TAP	CE	917500	Z2-087 TAP	CE	1	Base Case	operation	1334.0	127.33	130.11	DC	37.19
2247233	935000	AD1-133 TAP	CE	270717	DRESDEN ; R	CE	1	COMED_P1-2_345-L11212_B-S-C-A	operation	1528.0	198.73	200.23	DC	22.87

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247238	935000	AD1-133 TAP	CE	270717	DRESDEN ; R	CE	1	Base Case	operation	1334.0	136.64	137.68	DC	13.84
2247319	937160	AD2-153 TAP	CE	924040	AB2-047 TAP	CE	1	COMED_P1-2_345-L8002__-S	operation	1528.0	144.01	145.08	DC	16.34
2247211	939400	AE1-172 TAP	CE	934720	AD1-100 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	operation	1528.0	216.53	218.15	DC	24.76
2247213	939400	AE1-172 TAP	CE	934720	AD1-100 TAP	CE	1	Base Case	operation	1364.0	166.18	167.42	DC	16.84

16 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
2247293,2247292	5	Z2-087 TAP 345.0 kV - PONTIAC ; R 345.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	\$0
2247308,2247307	6	AB2-047 TAP 345.0 kV - Z2-087 TAP 345.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	\$0
2246982	3	KINCAID ; B 345.0 kV - 7AUSTIN 345.0 kV Ckt 1	<p><u>ComEd</u> No Reinforcement Needed. Not a valid violation</p> <p><u>AMIL</u> NonPJM Area : The external (i.e. Non-PJM) Transmission Owner, AMIL, will not evaluate this violation until the impact study phase. Project Type : FAC Cost : \$0 Time Estimate : N/A Months</p>	\$0
2247217,2247216	8	AE1-172 TAP 345.0 kV - AD1-100 TAP 345.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	\$0
2247226,2247225	2	LORETTO ; B 345.0 kV - AE1-172 TAP 345.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	\$0
2247240,2247239	7	AD1-133 TAP 345.0 kV - DRESDEN ; R 345.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	\$0
2247247,2247248	4	PONTIAC ; B 345.0 kV - LORETTO ; B 345.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	\$0
2247257,2247258	1	PONTIAC ; R 345.0 kV - AD1-133 TAP 345.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	\$0
			TOTAL COST	\$0

If “No Reinforcement Needed. Not a valid violation” was provided as the Upgrade Description for a facility in the System Reinforcements table then that facility met one of the following conditions:

- a. The loading on the facility at your queue position was less than 100%; therefore, the facility is not yet overloaded, but may be overloaded by end of the AE2 queue.
- b. The TO reviewed their ratings on the facility and determined that the current rating was greater than the rating in PJM’s model. This new rating was greater than the loading at your queue position making the violation invalid.
- c. The TO reviewed the contingency and determined that contingency was not valid; therefore the violation is invalid. Any contingency corrections will be assessed and corrected in the AE2 impact study phase.

17 Flow Gate Details

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

17.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247257	270853	PONTIAC ;R	CE	935000	AD1-133 TAP	CE	1	COMED_P1-2_345-L11212_B-S-C-A	single	1528.0	100.38	101.87	DC	22.87

Bus #	Bus	MW Impact
274650	KINCAID ;1U	12.31
274651	KINCAID ;2U	12.33
274853	TWINGROVE;U1	1.83
274854	TWINGROVE;U2	1.83
274863	CAYUGA RI;1U	1.7
274864	CAYUGA RI;2U	1.7
900404	X3-028 C	78.44
905081	W4-005 C	1.74
917501	Z2-087 C	1.47
924041	AB2-047 C O1	14.84
924261	AB2-070 C O1	6.98
925771	AC1-053 C	6.83
926841	AC1-171 C O1	0.75
930461	AB1-087	28.76
930471	AB1-088	28.76
933441	AC2-157 C	3.97
935141	AD1-148	12.3
936771	AD2-100 C O1	25.48
937161	AD2-153 C O1	9.91
937171	AD2-154 C O1	9.91
937211	AD2-159 C	10.33
939401	AE1-172 C O1	24.59
939741	AE1-205 C O1	39.12
940101	AE1-252 C O1	41.91
941731	AE2-173	22.87
942111	AE2-223 C	9.07
942481	AE2-261 C	32.16
942601	AE2-276	2.62
942913	AE2-310 BAT	2.96
950701	J196 C	1.11
951001	J339	12.11
951741	J474 C	4.81
952271	J644	12.24
952321	J734	10.17
952651	J756 C	4.36
952871	J757 C	5.19
953401	J811	10.29
953651	J815	34.82
953741	J826 C	3.01
953801	J835 C	3.42

Bus #	Bus	MW Impact
953851	J845 C	2.96
953881	J848 C	5.38
954181	J884	24.97
954411	J912	13.29
954721	J750 C	3.3
954761	J468 C	3.94
AD2-098	AD2-098	0.45
CBM-N	CBM-N	0.66
CBM-S1	CBM-S1	9.88
CBM-S2	CBM-S2	3.14
CBM-W2	CBM-W2	112.92
CIN	CIN	10.83
CPLE	CPLE	1.12
EDWARDS	EDWARDS	0.05
G-007A	G-007A	2.19
IPL	IPL	5.91
LGEE	LGEE	1.65
MEC	MEC	2.68
NYISO	NYISO	2.87
TATANKA	TATANKA	0.42
VFT	VFT	5.88

17.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247225	270704	LORETTO ;B	CE	939400	AE1-172 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	109.28	110.91	DC	24.76

Bus #	Bus	MW Impact
274650	KINCAID ;1U	13.71
274651	KINCAID ;2U	13.73
274853	TWINGROVE;U1	1.99
274854	TWINGROVE;U2	1.99
274863	CAYUGA RI;1U	2.24
274864	CAYUGA RI;2U	2.24
900404	X3-028 C	84.7
905081	W4-005 C	1.9
917501	Z2-087 C	1.59
924041	AB2-047 C O1	16.06
924261	AB2-070 C O1	7.65
925771	AC1-053 C	7.5
926841	AC1-171 C O1	0.96
930461	AB1-087	31.06
930471	AB1-088	31.06
933441	AC2-157 C	4.29
935001	AD1-133 C O1	90.83
935141	AD1-148	13.51
936771	AD2-100 C O1	28.25
937161	AD2-153 C O1	10.77
937171	AD2-154 C O1	10.77
937211	AD2-159 C	11.3
939741	AE1-205 C O1	42.48
941731	AE2-173	24.76
942111	AE2-223 C	9.81
942481	AE2-261 C	35.83
942601	AE2-276	2.83
942913	AE2-310 BAT	4.28
950291	J291	4.24
950701	J196 C	1.14
951001	J339	12.81
951741	J474 C	5.16
952271	J644	13.58
952321	J734	10.76
952651	J756 C	4.83
952871	J757 C	5.78
953401	J811	10.87
953651	J815	37.43
953741	J826 C	3.19
953801	J835 C	3.81

Bus #	Bus	MW Impact
953851	J845 C	3.12
953881	J848 C	5.76
954181	J884	26.74
954411	J912	14.21
954721	J750 C	3.62
954761	J468 C	4.05
AD2-098	AD2-098	0.36
CBM-N	CBM-N	0.57
CBM-S1	CBM-S1	11.07
CBM-S2	CBM-S2	3.34
CBM-W2	CBM-W2	130.63
CIN	CIN	11.59
CPLE	CPLE	1.17
G-007A	G-007A	1.93
IPL	IPL	6.27
LGEE	LGEE	1.71
MEC	MEC	9.12
NYISO	NYISO	2.49
VFT	VFT	5.19

17.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2246982	270796	KINCAID ;B	CE	347955	7AUSTIN	AMIL	1	COMED_P4_080-45-BT7-8_FSA	breaker	956.0	125.89	126.89	DC	9.59

Bus #	Bus	MW Impact
274650	KINCAID ;1U	26.53
274651	KINCAID ;2U	26.81
274853	TWINGROVE;U1	0.72
274854	TWINGROVE;U2	0.72
274890	CAYUG;1U E	8.37
274891	CAYUG;2U E	8.37
276150	W2-048 E	3.33
290261	S-027 E	23.55
290265	S-028 E	23.55
296125	R-030 C3	3.13
296128	R-030 E3	12.51
296271	R-030 C2	3.09
296272	R-030 E2	12.36
296308	R-030 C1	3.09
296309	R-030 E1	12.36
905081	W4-005 C	1.06
905082	W4-005 E	58.13
909052	X2-022 E	46.2
917501	Z2-087 C	0.61
917502	Z2-087 E	33.31
924041	AB2-047 C O1	6.22
924042	AB2-047 E O1	41.63
924261	AB2-070 C O1	5.83
924262	AB2-070 E O1	39.01
925771	AC1-053 C	6.01
925772	AC1-053 E	40.25
935141	AD1-148	12.07
936771	AD2-100 C O1	43.36
936772	AD2-100 E O1	28.91
936972	AD2-131 E O1	17.21
937161	AD2-153 C O1	5.05
937162	AD2-153 E O1	23.66
937171	AD2-154 C O1	5.05
937172	AD2-154 E O1	23.66
937211	AD2-159 C	6.28
937212	AD2-159 E	29.41
939401	AE1-172 C O1	2.99
939402	AE1-172 E O1	13.99
939741	AE1-205 C O1	7.82
939742	AE1-205 E O1	10.79
940101	AE1-252 C O1	5.09
940102	AE1-252 E O1	3.4

Bus #	Bus	MW Impact
941731	AE2-173	9.59
942111	AE2-223 C	3.73
942112	AE2-223 E	24.98
942481	AE2-261 C	64.84
942482	AE2-261 E	43.22
950701	J196 C	0.82
950702	J196 E	3.28
951001	J339	9.09
951741	J474 C	3.6
951742	J474 E	19.47
952321	J734	7.63
952651	J756 C	2.54
952652	J756 E	13.75
953741	J826 C	2.24
953742	J826 E	12.1
953851	J845 C	2.23
953852	J845 E	12.08
954181	J884	18.56
954761	J468 C	2.16
954762	J468 E	8.64
CALDERWOOD	CALDERWOOD	0.71
CANNELTON	CANNELTON	0.1
CARR	CARR	0.06
CATAWBA	CATAWBA	0.3
CHEOAH	CHEOAH	0.64
CHILHOWEE	CHILHOWEE	0.23
CIN	CIN	1.79
COFFEEN	COFFEEN	2.24
COTTONWOOD	COTTONWOOD	6.35
DUCKCREEK	DUCKCREEK	11.8
EDWARDS	EDWARDS	1.72
ELMERSMITH	ELMERSMITH	0.26
FARMERCITY	FARMERCITY	1.97
G-007	G-007	0.18
HAMLET	HAMLET	0.45
IPL	IPL	0.73
MECS	MECS	1.01
NEWTON	NEWTON	1.49
O-066	O-066	1.16
PRAIRIE	PRAIRIE	11.37
RENSSELAER	RENSSELAER	0.04
SANTEETLA	SANTEETLA	0.19
SMITHLAND	SMITHLAND	0.5
TATANKA	TATANKA	2.97
TVA	TVA	3.46
UNIONPOWER	UNIONPOWER	2.11

17.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247247	270852	PONTIAC ;B	CE	270704	LORETTO ;B	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	106.62	108.24	DC	24.78

Bus #	Bus	MW Impact
274650	KINCAID ;1U	13.73
274651	KINCAID ;2U	13.75
274853	TWINGROVE;U1	1.99
274854	TWINGROVE;U2	1.99
900404	X3-028 C	85.2
905081	W4-005 C	1.9
917501	Z2-087 C	1.6
924041	AB2-047 C O1	16.07
924261	AB2-070 C O1	7.66
925771	AC1-053 C	7.5
926841	AC1-171 C O1	0.97
930461	AB1-087	31.24
930471	AB1-088	31.24
933441	AC2-157 C	4.32
935001	AD1-133 C O1	90.89
935141	AD1-148	13.53
936771	AD2-100 C O1	28.29
937161	AD2-153 C O1	10.77
937171	AD2-154 C O1	10.77
937211	AD2-159 C	11.31
939741	AE1-205 C O1	42.51
941731	AE2-173	24.78
942111	AE2-223 C	9.82
942481	AE2-261 C	35.89
942601	AE2-276	2.85
942913	AE2-310 BAT	4.26
950291	J291	4.24
950701	J196 C	1.14
951001	J339	12.81
951741	J474 C	5.16
952251	J641	13.49
952271	J644	13.58
952321	J734	10.76
952651	J756 C	4.83
952871	J757 C	5.78
953401	J811	10.87
953651	J815	37.43
953741	J826 C	3.19
953801	J835 C	3.81
953851	J845 C	3.12

Bus #	Bus	MW Impact
953881	J848 C	5.76
954181	J884	26.74
954411	J912	14.21
954721	J750 C	3.62
954761	J468 C	4.05
AD2-098	AD2-098	0.36
CBM-N	CBM-N	0.6
CBM-S1	CBM-S1	11.17
CBM-S2	CBM-S2	3.39
CBM-W2	CBM-W2	131.41
CIN	CIN	11.67
CPLE	CPLE	1.19
G-007A	G-007A	2.01
IPL	IPL	6.32
LGEE	LGEE	1.73
MEC	MEC	9.28
NYISO	NYISO	2.59
VFT	VFT	5.41

17.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247292	917500	Z2-087 TAP	CE	270853	PONTIAC ; R	CE	1	COMED_P1-2_345-L8002__-S	single	1528.0	104.78	106.98	DC	33.72

Bus #	Bus	MW Impact
274650	KINCAID ;1U	13.1
274651	KINCAID ;2U	13.11
274853	TWINGROVE;U1	1.09
274854	TWINGROVE;U2	1.09
900404	X3-028 C	87.34
905081	W4-005 C	1.25
917501	Z2-087 C	2.18
924041	AB2-047 C O1	21.87
924261	AB2-070 C O1	8.98
925771	AC1-053 C	8.73
926841	AC1-171 C O1	1.02
930461	AB1-087	32.03
930471	AB1-088	32.03
933441	AC2-157 C	4.43
935141	AD1-148	15.44
936771	AD2-100 C O1	25.61
937161	AD2-153 C O1	14.03
937171	AD2-154 C O1	14.03
937211	AD2-159 C	7.44
941731	AE2-173	33.72
942111	AE2-223 C	13.41
942481	AE2-261 C	34.26
942601	AE2-276	2.92
942913	AE2-310 BAT	3.84
950291	J291	4.04
950701	J196 C	1.28
951001	J339	15.22
951741	J474 C	5.73
952271	J644	13.06
952321	J734	12.78
952651	J756 C	4.6
952871	J757 C	5.52
953401	J811	10.84
953651	J815	36.64
953741	J826 C	3.74
953801	J835 C	3.63
953851	J845 C	3.66
953881	J848 C	5.65
954181	J884	32.6
954411	J912	13.99
954721	J750 C	3.58

Bus #	Bus	MW Impact
954761	J468 C	4.33
AD2-098	AD2-098	0.43
CBM-N	CBM-N	0.68
CBM-S1	CBM-S1	11.06
CBM-S2	CBM-S2	3.46
CBM-W2	CBM-W2	129.01
CIN	CIN	12.12
CPLE	CPLE	1.23
G-007A	G-007A	2.28
IPL	IPL	6.57
LGEE	LGEE	1.81
MEC	MEC	6.08
NYISO	NYISO	2.97
TATANKA	TATANKA	0.01
VFT	VFT	6.12

17.6 Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247307	924040	AB2-047 TAP	CE	917500	Z2-087 TAP	CE	1	COMED_P1-2_345-L8002__-S	single	1528.0	105.29	107.5	DC	33.73

Bus #	Bus	MW Impact
274650	KINCAID ;1U	13.11
274651	KINCAID ;2U	13.12
274853	TWINGROVE;U1	1.09
274854	TWINGROVE;U2	1.09
900404	X3-028 C	87.56
905081	W4-005 C	1.25
924041	AB2-047 C O1	21.88
924261	AB2-070 C O1	8.98
925771	AC1-053 C	8.73
926841	AC1-171 C O1	1.03
930461	AB1-087	32.1
930471	AB1-088	32.1
933441	AC2-157 C	4.44
935141	AD1-148	15.45
936771	AD2-100 C O1	25.63
937161	AD2-153 C O1	14.04
937171	AD2-154 C O1	14.04
937211	AD2-159 C	7.45
941731	AE2-173	33.73
942481	AE2-261 C	34.29
942601	AE2-276	2.92
942913	AE2-310 BAT	3.84
950291	J291	4.04
950701	J196 C	1.28
951001	J339	15.22
951741	J474 C	5.73
952251	J641	12.82
952271	J644	13.06
952321	J734	12.78
952651	J756 C	4.6
952871	J757 C	5.52
953401	J811	10.84
953651	J815	36.64
953741	J826 C	3.74
953801	J835 C	3.63
953851	J845 C	3.66
953881	J848 C	5.65
954181	J884	32.6
954411	J912	13.99
954681	J949	19.05
954721	J750 C	3.58

Bus #	Bus	MW Impact
954761	J468 C	4.33
AD2-098	AD2-098	0.43
CBM-N	CBM-N	0.7
CBM-S1	CBM-S1	11.11
CBM-S2	CBM-S2	3.48
CBM-W2	CBM-W2	129.36
CIN	CIN	12.16
CPLE	CPLE	1.24
G-007A	G-007A	2.32
IPL	IPL	6.59
LGEE	LGEE	1.82
MEC	MEC	6.14
NYISO	NYISO	3.02
VFT	VFT	6.22

17.7 Index 7

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247239	935000	AD1-133 TAP	CE	270717	DRESDEN ; R	CE	1	COMED_P1-2_345-L11212_B-S-C-A	single	1528.0	108.14	109.64	DC	22.87

Bus #	Bus	MW Impact
274650	KINCAID ;1U	12.31
274651	KINCAID ;2U	12.33
274853	TWINGROVE;U1	1.83
274854	TWINGROVE;U2	1.83
274863	CAYUGA RI;1U	1.7
274864	CAYUGA RI;2U	1.7
900404	X3-028 C	78.44
905081	W4-005 C	1.74
917501	Z2-087 C	1.47
924041	AB2-047 C O1	14.84
924261	AB2-070 C O1	6.98
925771	AC1-053 C	6.83
926841	AC1-171 C O1	0.75
930461	AB1-087	28.76
930471	AB1-088	28.76
933441	AC2-157 C	3.97
935001	AD1-133 C O1	120.39
935141	AD1-148	12.3
936771	AD2-100 C O1	25.48
937161	AD2-153 C O1	9.91
937171	AD2-154 C O1	9.91
937211	AD2-159 C	10.33
939401	AE1-172 C O1	24.59
939741	AE1-205 C O1	39.12
940101	AE1-252 C O1	41.91
941731	AE2-173	22.87
942111	AE2-223 C	9.07
942481	AE2-261 C	32.16
942601	AE2-276	2.62
942913	AE2-310 BAT	2.96
950701	J196 C	1.11
951001	J339	12.11
951741	J474 C	4.81
952271	J644	12.24
952321	J734	10.17
952651	J756 C	4.36
952871	J757 C	5.19
953401	J811	10.29
953651	J815	34.82
953741	J826 C	3.01

Bus #	Bus	MW Impact
953801	J835 C	3.42
953851	J845 C	2.96
953881	J848 C	5.38
954181	J884	24.97
954411	J912	13.29
954721	J750 C	3.3
954761	J468 C	3.94
AD2-098	AD2-098	0.45
CBM-N	CBM-N	0.66
CBM-S1	CBM-S1	9.88
CBM-S2	CBM-S2	3.14
CBM-W2	CBM-W2	112.92
CIN	CIN	10.83
CPLE	CPLE	1.12
EDWARDS	EDWARDS	0.05
G-007A	G-007A	2.19
IPL	IPL	5.91
LGEE	LGEE	1.65
MEC	MEC	2.68
NYISO	NYISO	2.87
TATANKA	TATANKA	0.42
VFT	VFT	5.88

17.8 Index 8

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247216	939400	AE1-172 TAP	CE	934720	AD1-100 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	114.98	116.6	DC	24.76

Bus #	Bus	MW Impact
274650	KINCAID ;1U	13.71
274651	KINCAID ;2U	13.73
274853	TWINGROVE;U1	1.99
274854	TWINGROVE;U2	1.99
274863	CAYUGA RI;1U	2.24
274864	CAYUGA RI;2U	2.24
900404	X3-028 C	84.7
905081	W4-005 C	1.9
917501	Z2-087 C	1.59
924041	AB2-047 C O1	16.06
924261	AB2-070 C O1	7.65
925771	AC1-053 C	7.5
926841	AC1-171 C O1	0.96
930461	AB1-087	31.06
930471	AB1-088	31.06
933441	AC2-157 C	4.29
935001	AD1-133 C O1	90.83
935141	AD1-148	13.51
936771	AD2-100 C O1	28.25
937161	AD2-153 C O1	10.77
937171	AD2-154 C O1	10.77
937211	AD2-159 C	11.3
939401	AE1-172 C O1	35.5
939741	AE1-205 C O1	42.48
940101	AE1-252 C O1	60.51
941731	AE2-173	24.76
942111	AE2-223 C	9.81
942481	AE2-261 C	35.83
942601	AE2-276	2.83
942913	AE2-310 BAT	4.28
950701	J196 C	1.14
951001	J339	12.81
951741	J474 C	5.16
952271	J644	13.58
952321	J734	10.76
952651	J756 C	4.83
952871	J757 C	5.78
953401	J811	10.87
953651	J815	37.43
953741	J826 C	3.19

Bus #	Bus	MW Impact
953801	J835 C	3.81
953851	J845 C	3.12
953881	J848 C	5.76
954181	J884	26.74
954411	J912	14.21
954721	J750 C	3.62
AD2-098	AD2-098	0.36
CBM-N	CBM-N	0.57
CBM-S1	CBM-S1	11.07
CBM-S2	CBM-S2	3.34
CBM-W2	CBM-W2	130.63
CIN	CIN	11.59
CPLE	CPLE	1.17
G-007A	G-007A	1.93
IPL	IPL	6.27
LGEE	LGEE	1.71
MEC	MEC	9.12
NYISO	NYISO	2.49
VFT	VFT	5.19

Affected Systems

18 Affected Systems

18.1 LG&E

LG&E Impacts to be determined during later study phases (as applicable).

18.2 MISO

MISO Impacts to be determined during later study phases (as applicable).

18.3 TVA

TVA Impacts to be determined during later study phases (as applicable).

18.4 Duke Energy Progress

Duke Energy Progress Impacts to be determined during later study phases (as applicable).

18.5 NYISO

NYISO Impacts to be determined during later study phases (as applicable).

Contingency Name	Contingency Definition
COMED_P1-2_345-L11212_B-S-C-A	CONTINGENCY 'COMED_P1-2_345-L11212_B-S-C-A' TRIP BRANCH FROM BUS 934720 TO BUS 939400 CKT 1 END / AD1-100 TAP 345 AE1-172 TAP 345
COMED_P1-2_345-L11212_B-S-C-B	CONTINGENCY 'COMED_P1-2_345-L11212_B-S-C-B' TRIP BRANCH FROM BUS 939400 TO BUS 270704 CKT 1 END / AE1-172 TAP 345 LORET; B 345
COMED_P4_080-45-BT7-8_FSA	CONTINGENCY 'COMED_P4_080-45-BT7-8_FSA' TRIP BRANCH FROM BUS 270853 TO BUS 917500 CKT 1 TRIP BRANCH FROM BUS 270853 TO BUS 935000 CKT 1 CONTINGENCY LINE ADDED FOR AE1 BUILD END / PONTIAC ; R 345 Z2-087 TAP 345 / PONTIAC ; R 345 AD1-133 TAP 345 /*
COMED_P1-2_345-L17802__-S	CONTINGENCY 'COMED_P1-2_345-L17802__-S' TRIP BRANCH FROM BUS 270668 TO BUS 905080 CKT 1 END / BLUEM; B 345 W4-005
COMED_P1-2_345-L8014__-S-A	CONTINGENCY 'COMED_P1-2_345-L8014__-S-A' TRIP BRANCH FROM BUS 270853 TO BUS 935000 CKT 1 END / PONTIAC ; R 345 AD1-133 TAP 345
COMED_P1-2_345-L8014__-S-B	CONTINGENCY 'COMED_P1-2_345-L8014__-S-B' TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 END / AD1-133 TAP 345 DRESDEN ; R 345
Base Case	
COMED_P1-2_345-L8002__-S	CONTINGENCY 'COMED_P1-2_345-L8002__-S' TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1 END / PONTI; B 345 BLUEM; B 345

Short Circuit

19 Short Circuit

No issues identified

20 Secondary Point of Interconnection General

20.1 Secondary Point of Interconnection

Under this option, Queue Position AE2-173, a 50 MW storage facility, proposes to interconnect with the ComEd transmission system by tying into the 345kV bus at Pontiac Midpoint TSS 80.

Pontiac Midpoint TSS 80 is a 345kV substation in a ring bus configuration. The generator lead for AE2-173 would be interconnected to this substation by expanding it.

20.2 Cost Summary

Will be supplied in Impact Study should the Interconnection Customer elect this option.

21 Network Impacts for Secondary Point of Interconnection

The Queue Project AE2-173 was evaluated as a 50.0 MW (Capacity 50.0 MW) injection at the Pontiac Midpoint; B 345kV substation in the ComEd area. Project AE2-173 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-173 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

Summer Peak Load Flow

22 Generation Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247258	270853	PONTIAC ;R	CE	935000	AD1-133 TAP	CE	1	COMED_P1-2_345-L11212_B-S-C-B	single	1528.0	96.3	97.83	DC	23.33

23 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

24 Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247225	270704	LORETTO ;B	CE	939400	AE1-172 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	109.29	110.94	DC	25.34
2247226	270704	LORETTO ;B	CE	939400	AE1-172 TAP	CE	1	COMED_P1-2_345-L8014__-S-A	single	1528.0	104.29	105.95	DC	25.34
2247247	270852	PONTIAC ;B	CE	270704	LORETTO ;B	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	106.62	108.28	DC	25.36
2247248	270852	PONTIAC ;B	CE	270704	LORETTO ;B	CE	1	COMED_P1-2_345-L8014__-S-A	single	1528.0	100.73	102.39	DC	25.36
2247257	270853	PONTIAC ;R	CE	935000	AD1-133 TAP	CE	1	COMED_P1-2_345-L11212_B-S-C-A	single	1528.0	100.38	101.91	DC	23.33
2247239	935000	AD1-133 TAP	CE	270717	DRESDEN ;R	CE	1	COMED_P1-2_345-L11212_B-S-C-A	single	1528.0	108.14	109.67	DC	23.33
2247240	935000	AD1-133 TAP	CE	270717	DRESDEN ;R	CE	1	COMED_P1-2_345-L11212_B-S-C-B	single	1528.0	103.82	105.34	DC	23.33
2247216	939400	AE1-172 TAP	CE	934720	AD1-100 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	114.97	116.63	DC	25.34
2247217	939400	AE1-172 TAP	CE	934720	AD1-100 TAP	CE	1	COMED_P1-2_345-L8014__-S-A	single	1528.0	109.1	110.75	DC	25.34

25 Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC/DC	MW IMPACT
2247220	270704	LORETTO ;B	CE	939400	AE1-172 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	operation	1528.0	199.99	201.65	DC	25.34
2247222	270704	LORETTO ;B	CE	939400	AE1-172 TAP	CE	1	Base Case	operation	1364.0	150.59	151.86	DC	17.3
2247242	270852	PONTIAC ;B	CE	270704	LORETTO ;B	CE	1	COMED_P1-2_345-L8014__-S-B	operation	1528.0	188.13	189.79	DC	25.36
2247244	270852	PONTIAC ;B	CE	270704	LORETTO ;B	CE	1	Base Case	operation	1364.0	137.91	139.18	DC	17.32
2247251	270853	PONTIAC ;R	CE	935000	AD1-133 TAP	CE	1	COMED_P1-2_345-L11212_B-S-C-A	operation	1528.0	185.71	187.24	DC	23.33
2247256	270853	PONTIAC ;R	CE	935000	AD1-133 TAP	CE	1	Base Case	operation	1334.0	123.85	124.9	DC	14.05
2247329	348847	7BROKAW	AMIL	937160	AD2-153 TAP	CE	1	COMED_P1-2_345-L8002__-S	operation	1528.0	133.69	134.7	DC	15.44
2247287	917500	Z2-087 TAP	CE	270853	PONTIAC ;R	CE	1	COMED_P1-2_345-L8002__-S	operation	1528.0	163.37	164.38	DC	15.44
2247302	924040	AB2-047 TAP	CE	917500	Z2-087 TAP	CE	1	COMED_P1-2_345-L8002__-S	operation	1528.0	154.9	155.91	DC	15.44
2247503	934730	AD1-100 TAP	CE	270670	BRAIDWOOD; B	CE	1	COMED_P1-2_345-L11212_B-S-A	operation	1528.0	99.77	100.48	DC	10.81
2247233	935000	AD1-133 TAP	CE	270717	DRESDEN ;R	CE	1	COMED_P1-2_345-L11212_B-S-C-A	operation	1528.0	198.73	200.25	DC	23.33
2247238	935000	AD1-133 TAP	CE	270717	DRESDEN ;R	CE	1	Base Case	operation	1334.0	135.69	136.74	DC	14.05
2247319	937160	AD2-153 TAP	CE	924040	AB2-047 TAP	CE	1	COMED_P1-2_345-L8002__-S	operation	1528.0	144.01	145.02	DC	15.44
2247211	939400	AE1-172 TAP	CE	934720	AD1-100 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	operation	1528.0	216.53	218.19	DC	25.34

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247213	939400	AE1-172 TAP	CE	934720	AD1-100 TAP	CE	1	Base Case	operation	1364.0	166.18	167.45	DC	17.3

26 Flow Gate Details

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

26.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247257	270853	PONTIAC ;R	CE	935000	AD1-133 TAP	CE	1	COMED_P1-2_345-L11212_B-S-C-A	single	1528.0	100.38	101.91	DC	23.33

Bus #	Bus	MW Impact
274650	KINCAID ;1U	12.31
274651	KINCAID ;2U	12.33
274853	TWINGROVE;U1	1.83
274854	TWINGROVE;U2	1.83
274863	CAYUGA RI;1U	1.7
274864	CAYUGA RI;2U	1.7
900404	X3-028 C	78.45
905081	W4-005 C	1.74
917501	Z2-087 C	1.47
924041	AB2-047 C O1	14.84
924261	AB2-070 C O1	6.98
925771	AC1-053 C	6.83
926841	AC1-171 C O1	0.75
930461	AB1-087	28.77
930471	AB1-088	28.77
933441	AC2-157 C	3.97
935141	AD1-148	12.3
936771	AD2-100 C O1	25.49
937161	AD2-153 C O1	9.91
937171	AD2-154 C O1	9.91
937211	AD2-159 C	10.33
939401	AE1-172 C O1	24.59
939741	AE1-205 C O1	39.12
940101	AE1-252 C O1	41.91
941731	AE2-173	23.33
942111	AE2-223 C	9.07
942481	AE2-261 C	32.16
942601	AE2-276	2.62
942913	AE2-310 BAT	2.92
950701	J196 C	1.11
951001	J339	12.11
951741	J474 C	4.81
952271	J644	12.24
952321	J734	10.17
952651	J756 C	4.36
952871	J757 C	5.19
953401	J811	10.29
953651	J815	34.82
953741	J826 C	3.01
953801	J835 C	3.42

Bus #	Bus	MW Impact
953851	J845 C	2.96
953881	J848 C	5.38
954181	J884	24.97
954411	J912	13.29
954721	J750 C	3.3
954761	J468 C	3.94
AD2-098	AD2-098	0.45
CBM-N	CBM-N	0.66
CBM-S1	CBM-S1	9.88
CBM-S2	CBM-S2	3.14
CBM-W2	CBM-W2	112.95
CIN	CIN	10.84
CPLE	CPLE	1.12
EDWARDS	EDWARDS	0.05
G-007A	G-007A	2.19
IPL	IPL	5.91
LGEE	LGEE	1.65
MEC	MEC	2.68
NYISO	NYISO	2.87
TATANKA	TATANKA	0.42
VFT	VFT	5.88

26.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247225	270704	LORETTO ; B	CE	939400	AE1-172 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	109.29	110.94	DC	25.34

Bus #	Bus	MW Impact
274650	KINCAID ;1U	13.71
274651	KINCAID ;2U	13.73
274853	TWINGROVE;U1	1.99
274854	TWINGROVE;U2	1.99
274863	CAYUGA RI;1U	2.24
274864	CAYUGA RI;2U	2.24
900404	X3-028 C	84.72
905081	W4-005 C	1.9
917501	Z2-087 C	1.59
924041	AB2-047 C O1	16.06
924261	AB2-070 C O1	7.65
925771	AC1-053 C	7.5
926841	AC1-171 C O1	0.96
930461	AB1-087	31.06
930471	AB1-088	31.06
933441	AC2-157 C	4.29
935001	AD1-133 C O1	90.83
935141	AD1-148	13.51
936771	AD2-100 C O1	28.25
937161	AD2-153 C O1	10.77
937171	AD2-154 C O1	10.77
937211	AD2-159 C	11.3
939741	AE1-205 C O1	42.48
941731	AE2-173	25.34
942111	AE2-223 C	9.81
942481	AE2-261 C	35.84
942601	AE2-276	2.83
942913	AE2-310 BAT	4.47
950291	J291	4.24
950701	J196 C	1.14
951001	J339	12.81
951741	J474 C	5.16
952271	J644	13.58
952321	J734	10.76
952651	J756 C	4.83
952871	J757 C	5.78
953401	J811	10.87
953651	J815	37.43
953741	J826 C	3.19
953801	J835 C	3.81

Bus #	Bus	MW Impact
953851	J845 C	3.12
953881	J848 C	5.76
954181	J884	26.74
954411	J912	14.21
954721	J750 C	3.62
954761	J468 C	4.05
AD2-098	AD2-098	0.36
CBM-N	CBM-N	0.57
CBM-S1	CBM-S1	11.07
CBM-S2	CBM-S2	3.34
CBM-W2	CBM-W2	130.63
CIN	CIN	11.59
CPLE	CPLE	1.17
G-007A	G-007A	1.93
IPL	IPL	6.27
LGEE	LGEE	1.71
MEC	MEC	9.12
NYISO	NYISO	2.48
VFT	VFT	5.19

26.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247247	270852	PONTIAC ;B	CE	270704	LORETTO ;B	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	106.62	108.28	DC	25.36

Bus #	Bus	MW Impact
274650	KINCAID ;1U	13.73
274651	KINCAID ;2U	13.75
274853	TWINGROVE;U1	1.99
274854	TWINGROVE;U2	1.99
900404	X3-028 C	85.2
905081	W4-005 C	1.9
917501	Z2-087 C	1.6
924041	AB2-047 C O1	16.07
924261	AB2-070 C O1	7.66
925771	AC1-053 C	7.5
926841	AC1-171 C O1	0.97
930461	AB1-087	31.24
930471	AB1-088	31.24
933441	AC2-157 C	4.32
935001	AD1-133 C O1	90.89
935141	AD1-148	13.53
936771	AD2-100 C O1	28.29
937161	AD2-153 C O1	10.77
937171	AD2-154 C O1	10.77
937211	AD2-159 C	11.31
939741	AE1-205 C O1	42.51
941731	AE2-173	25.36
942111	AE2-223 C	9.82
942481	AE2-261 C	35.89
942601	AE2-276	2.85
942913	AE2-310 BAT	4.46
950291	J291	4.24
950701	J196 C	1.14
951001	J339	12.81
951741	J474 C	5.16
952251	J641	13.49
952271	J644	13.58
952321	J734	10.76
952651	J756 C	4.83
952871	J757 C	5.78
953401	J811	10.87
953651	J815	37.43
953741	J826 C	3.19
953801	J835 C	3.81
953851	J845 C	3.12

Bus #	Bus	MW Impact
953881	J848 C	5.76
954181	J884	26.74
954411	J912	14.21
954721	J750 C	3.62
954761	J468 C	4.05
AD2-098	AD2-098	0.36
CBM-N	CBM-N	0.6
CBM-S1	CBM-S1	11.17
CBM-S2	CBM-S2	3.39
CBM-W2	CBM-W2	131.41
CIN	CIN	11.67
CPLE	CPLE	1.19
G-007A	G-007A	2.01
IPL	IPL	6.32
LGEE	LGEE	1.73
MEC	MEC	9.28
NYISO	NYISO	2.59
VFT	VFT	5.4

26.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247239	935000	AD1-133 TAP	CE	270717	DRESDEN ; R	CE	1	COMED_P1-2_345-L11212_B-S-C-A	single	1528.0	108.14	109.67	DC	23.33

Bus #	Bus	MW Impact
274650	KINCAID ;1U	12.31
274651	KINCAID ;2U	12.33
274853	TWINGROVE;U1	1.83
274854	TWINGROVE;U2	1.83
274863	CAYUGA RI;1U	1.7
274864	CAYUGA RI;2U	1.7
900404	X3-028 C	78.45
905081	W4-005 C	1.74
917501	Z2-087 C	1.47
924041	AB2-047 C O1	14.84
924261	AB2-070 C O1	6.98
925771	AC1-053 C	6.83
926841	AC1-171 C O1	0.75
930461	AB1-087	28.77
930471	AB1-088	28.77
933441	AC2-157 C	3.97
935001	AD1-133 C O1	120.39
935141	AD1-148	12.3
936771	AD2-100 C O1	25.49
937161	AD2-153 C O1	9.91
937171	AD2-154 C O1	9.91
937211	AD2-159 C	10.33
939401	AE1-172 C O1	24.59
939741	AE1-205 C O1	39.12
940101	AE1-252 C O1	41.91
941731	AE2-173	23.33
942111	AE2-223 C	9.07
942481	AE2-261 C	32.16
942601	AE2-276	2.62
942913	AE2-310 BAT	2.92
950701	J196 C	1.11
951001	J339	12.11
951741	J474 C	4.81
952271	J644	12.24
952321	J734	10.17
952651	J756 C	4.36
952871	J757 C	5.19
953401	J811	10.29
953651	J815	34.82
953741	J826 C	3.01

Bus #	Bus	MW Impact
953801	J835 C	3.42
953851	J845 C	2.96
953881	J848 C	5.38
954181	J884	24.97
954411	J912	13.29
954721	J750 C	3.3
954761	J468 C	3.94
AD2-098	AD2-098	0.45
CBM-N	CBM-N	0.66
CBM-S1	CBM-S1	9.88
CBM-S2	CBM-S2	3.14
CBM-W2	CBM-W2	112.95
CIN	CIN	10.84
CPLE	CPLE	1.12
EDWARDS	EDWARDS	0.05
G-007A	G-007A	2.19
IPL	IPL	5.91
LGEE	LGEE	1.65
MEC	MEC	2.68
NYISO	NYISO	2.87
TATANKA	TATANKA	0.42
VFT	VFT	5.88

26.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2247216	939400	AE1-172 TAP	CE	934720	AD1-100 TAP	CE	1	COMED_P1-2_345-L8014__-S-B	single	1528.0	114.97	116.63	DC	25.34

Bus #	Bus	MW Impact
274650	KINCAID ;1U	13.71
274651	KINCAID ;2U	13.73
274853	TWINGROVE;U1	1.99
274854	TWINGROVE;U2	1.99
274863	CAYUGA RI;1U	2.24
274864	CAYUGA RI;2U	2.24
900404	X3-028 C	84.72
905081	W4-005 C	1.9
917501	Z2-087 C	1.59
924041	AB2-047 C O1	16.06
924261	AB2-070 C O1	7.65
925771	AC1-053 C	7.5
926841	AC1-171 C O1	0.96
930461	AB1-087	31.06
930471	AB1-088	31.06
933441	AC2-157 C	4.29
935001	AD1-133 C O1	90.83
935141	AD1-148	13.51
936771	AD2-100 C O1	28.25
937161	AD2-153 C O1	10.77
937171	AD2-154 C O1	10.77
937211	AD2-159 C	11.3
939401	AE1-172 C O1	35.5
939741	AE1-205 C O1	42.48
940101	AE1-252 C O1	60.51
941731	AE2-173	25.34
942111	AE2-223 C	9.81
942481	AE2-261 C	35.84
942601	AE2-276	2.83
942913	AE2-310 BAT	4.47
950701	J196 C	1.14
951001	J339	12.81
951741	J474 C	5.16
952271	J644	13.58
952321	J734	10.76
952651	J756 C	4.83
952871	J757 C	5.78
953401	J811	10.87
953651	J815	37.43
953741	J826 C	3.19

Bus #	Bus	MW Impact
953801	J835 C	3.81
953851	J845 C	3.12
953881	J848 C	5.76
954181	J884	26.74
954411	J912	14.21
954721	J750 C	3.62
AD2-098	AD2-098	0.36
CBM-N	CBM-N	0.57
CBM-S1	CBM-S1	11.07
CBM-S2	CBM-S2	3.34
CBM-W2	CBM-W2	130.63
CIN	CIN	11.59
CPLE	CPLE	1.17
G-007A	G-007A	1.93
IPL	IPL	6.27
LGEE	LGEE	1.71
MEC	MEC	9.12
NYISO	NYISO	2.48
VFT	VFT	5.19

Contingency Name	Contingency Definition
COMED_P1-2_345-L11212_B-S-A	CONTINGENCY 'COMED_P1-2_345-L11212_B-S-A' TRIP BRANCH FROM BUS 270926 TO BUS 937030 CKT 1 END / WILTO; B 345 AD2-137 TAP 345
COMED_P1-2_345-L11212_B-S-C-A	CONTINGENCY 'COMED_P1-2_345-L11212_B-S-C-A' TRIP BRANCH FROM BUS 934720 TO BUS 939400 CKT 1 END / AD1-100 TAP 345 AE1-172 TAP 345
COMED_P1-2_345-L11212_B-S-C-B	CONTINGENCY 'COMED_P1-2_345-L11212_B-S-C-B' TRIP BRANCH FROM BUS 939400 TO BUS 270704 CKT 1 END / AE1-172 TAP 345 LORET; B 345
COMED_P1-2_345-L8014___-S-A	CONTINGENCY 'COMED_P1-2_345-L8014___-S-A' TRIP BRANCH FROM BUS 270853 TO BUS 935000 CKT 1 END / PONTIAC ; R 345 AD1-133 TAP 345
COMED_P1-2_345-L8014___-S-B	CONTINGENCY 'COMED_P1-2_345-L8014___-S-B' TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 END / AD1-133 TAP 345 DRESDEN ; R 345
Base Case	
COMED_P1-2_345-L8002___-S	CONTINGENCY 'COMED_P1-2_345-L8002___-S' TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1 END / PONTI; B 345 BLUEM; B 345

Short Circuit

27 Short Circuit

No issues identified